

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A casting nozzle having a molten steel flow hole portion, in which a plurality of independent members comprising at least one of protrusion portions and concave portions discontinuous in both directions parallel and perpendicular to a molten steel flowing direction are disposed, wherein each of said protrusion portions or the concave portions has a size satisfying expressions:

$$H \geq 2\text{mm}$$

$$L > 2 \times H$$

in which H is a maximum height of the protrusion portion or a maximum depth of the concave portion, and L is a maximum length of a base portion of the protrusion portion or the concave portion, to prevent a flow of the molten steel from stagnating in the molten steel flow hole portion,

wherein the independent members make an inner surface area of the molten steel flow hole portion rough so that an inner diameter of the molten steel flow hole portion becomes variable over the inner surface of the rough area,

~~wherein~~ the casting nozzle is an immersion nozzle, and

~~the base portions of the independent members are spaced apart from one another by portions of a flat surface of the inner surface area of the molten steel flow hole portion.~~

2. (previously presented): The casting nozzle according to claim 1, wherein each of said protrusion portions or the concave portions satisfies an expression:

$$L \leq \pi D/3$$

in which L is the maximum length of a base portion of the protrusion portion or the concave portion, and D is an inner diameter of the nozzle before the protrusion portions or concave portions are disposed.

3. (previously presented): The casting nozzle according to claim 1, wherein said protrusion portions or the concave portions are disposed so that an inner surface area of a molten steel flow path in a range in which said protrusion portions or the concave portions are disposed is 102-350 % as large as an inner surface area of the molten steel path before disposition of said protrusion portions or the concave portions.

4. (previously presented): The casting nozzle according to claim 1, wherein said casting nozzle has a portion where said protrusion portions or the concave portions are disposed in a zigzag pattern so that positions of corresponding protrusion portions or concave portions are displaced at least in the direction perpendicular to the molten steel flowing direction.

5. (previously presented): The casting nozzle according to claim 1, wherein said protrusion portions or the concave portions are disposed over an entire or a part of the molten steel flow hole portion of the casting nozzle.

6. (previously presented): The casting nozzle according to claim 1, wherein said protrusion portions or the concave portions are disposed to be not higher than a meniscus of the casting nozzle.

7. (previously presented): The casting nozzle according to claim 1, wherein a distance between the base portions of said protrusion portions in the direction parallel to the molten steel flowing direction is selected to be equal to or greater than 20 mm to prevent generation of a stagnation portion on an area of the inner hole portion disposed under the protrusion portion.

8. (previously presented): The casting nozzle according to claim 1, wherein the height of each of said protrusion portions is 2-20 mm.

9. (previously presented): The casting nozzle according to claim 1, wherein a number of said protrusion portions disposed in the molten steel flowing hole portion is equal to or greater than 4.

10. (previously presented): The casting nozzle according to claim 1, wherein an angle between a nozzle inner pipe and a lower end portion of each of said protrusion portions in the direction parallel to the molten steel flowing direction is selected to be equal to or less than 60° to prevent generation of a stagnation portion on an area of the inner hole portion disposed under the protrusion portion.

11. (previously presented): The casting nozzle according to claim 1, wherein said protrusion portions are molded to be integrated with a body of the casting nozzle.

12. (previously presented): The casting nozzle according to claim 1, wherein said casting nozzle is the immersion nozzle for continuously casting steel.

13. (previously presented): The casting nozzle according to claim 1, wherein the inner rough area of the molten steel flow hole portion is generally one of circular and elliptical.

14. (previously presented): The casting nozzle according to claim 13, wherein a cross-section of the inner rough area in the direction perpendicular to the molten steel flowing direction comprises discontinuous circumferential segments.

15. (previously presented): The casting nozzle according to claim 1, wherein the independent members include at least one of elliptical, spherical, semi-spherical, and approximate polygonal pyramid independent members.

16. (previously presented): The casting nozzle according to claim 15, wherein the independent members include at least one of the elliptical and spherical independent members.

17. (previously presented): The casting nozzle according to claim 15, wherein the independent members include at least one of semi-spherical protrusion portions and approximate polygonal pyramid protrusion portions, and wherein an angle between a nozzle inner pipe and a lower end portion of each protrusion portion in the direction parallel to the molten steel flowing

direction is selected to be equal to or less than 60° to prevent generation of a stagnation portion on an area of the inner hole portion disposed under the protrusion portion.

18. (previously presented): The casting nozzle according to claim 1, wherein the independent members include the protrusion portions, each having the height equal to or greater than 2mm and the length of the base portion in the direction parallel to the molten steel flowing direction is greater than a double of the height to prevent generation of a stagnation portion on an area of the inner hole portion disposed under the protrusion portion.

19. (previously presented): The casting nozzle according to claim 1, wherein the immersion nozzle includes a straight immersion nozzle having the inner diameter before the protrusion portions or concave portions are disposed of a substantially invariable value in the direction parallel to the molten steel flowing direction.

20. (previously presented): The casting nozzle according to claim 1, wherein the immersion nozzle includes a stationary immersion nozzle.